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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KENNETH S. MURPHY

Appeal 2009-005353
Application 10/734,078
Technology Center 1700

Before CHUNG K. PAK, CHARLES F. WARREN, and
PETER F. KRATZ, *Administrative Patent Judges.*

WARREN, *Administrative Patent Judge.*

DECISION ON APPEAL[1]

Applicant appeals to the Board from the decision of the Primary Examiner finally rejecting claims 11-17 in the Office Action mailed July 3, 2007. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 41.31(a) (2007).

We affirm-in-part the decision of the Primary Examiner.

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

Claim 11 illustrates Appellant's invention of a coated article, and is representative of the claims on appeal:

11. A coated article, comprising a nickel base superalloy substrate consisting essentially of, in weight %, about 3% to about 12% Cr, up to about 15% Co, up to about 3% Mo, about 3% to about 10% W, up to about 6% Re, about 5% to about 7% Al, up to about 2% Ti, up to about 1% Fe, up to about 2% Nb, about 3% to about 12% Ta, up to about 0.07% C, about 0.030% to about 0.80% Hf, up to about 0.10% Zr, up to about 0.02% B, up to about 0.050% of a rare earth element, and balance Ni and incidental impurities, an outwardly grown diffusion aluminide bondcoat on the substrate, and a ceramic thermal barrier coating disposed on the bondcoat, wherein spallation life of the ceramic thermal barrier coating during cyclic oxidation is prolonged.

Appellant requests review of the grounds of rejection under 35 U.S.C. § 103(a) advanced on appeal by the Examiner: claims 11-16 over Nishihata (JP 2000-42755 A) in view of Warnes (US 5,989,733); claims 11 and 17 over Gell (US 4,116,723) in view of Warnes; claims 11 and 17 over Shaw (US 3,832,167) in view of Warnes; claims 11 and 17 over Gell in view of Spitsberg (US 6,551,423); and claims 11 and 17 over Shaw in view of Spitsberg. Br. 8; Ans. 3, 6, 8, 10, and 12.

Appellant argues claim 11 with respect to all of the grounds of rejection. *See generally* Br. Thus, we decide this appeal based on claim 11. 37 C.F.R. § 41.37(c)(1)(vii) (2007).

Opinion

I.

We determine that claim 11 specifies any coated article comprising at least a nickel base superalloy substrate consisting essentially of the recited elements as specified by the weight percent ranges; any outwardly grown diffusion aluminide bondcoat on the substrate; and any ceramic thermal

barrier coating disposed on the bondcoat. *See* Spec., e.g., 2-3. We note that dependent claim 16 specifies that the outwardly grown diffusion aluminide bondcoat comprises a single phase platinum-modified diffusion aluminide coating.

With respect to the elements in the nickel base superalloy substrate, we essentially agree with the Examiner's findings of ranges of elements specified in independent claim 11 for the nickel base superalloy substrate set forth in the tables in the Answer. Ans. 4, 6, 8, 10, and 12. We find that in the Examiner's tables, the range of the element Co should be specified as "up to about 15%" by weight. We further find that the Examiner's tables do not make clear that claim 11 specifies that *any* rare earth element can be present "up to about 0.050%" by weight in the nickel base superalloy substrate. We interpret the phrase "up to about" a specific upper limit to define a weight percent range which includes "zero" as a lower limit. In addition to Co and a rare earth element, this language is used to specify the ranges for the elements Mo, Re, Ti, Fe, Nb, C, Zr, and B, all of which are thus optional elements in the claimed nickel base superalloy substrate. *See* Spec., e.g., 2-3 and Table 1. *See, e.g., In re Mochel*, 470 F.2d 638, 640 (CCPA 1972). With respect to the rare earth element in the Examiner's tables, we determine that dependent claim 12 specifies that the rare earth element can be "selected from the group consisting of Y and Lanthanide series elements with atomic numbers from 58 to 71," which range includes the element Ce. We further determine that claim 13, dependent on claim 12, specifies that the rare earth element of claim 12 must be present in the range of about 0.0005 to about 0.050 weight %.

We determine that dependent Claim 17, which is included in the grounds of rejection over Gell and over Shaw, specifies that the nickel base superalloy substrate "comprises a gas turbine engine blade."

We determine that the plain claim language "wherein spallation life of the ceramic thermal barrier coating during cyclic oxidation is prolonged" in claim 11, specifies that the spallation life of any ceramic thermal barrier coating on any outwardly grown diffusion aluminide bondcoat on any specified nickel base superalloy substrate during cyclic oxidation is "prolonged" to any extent. *See generally* Spec.

II. Claim 11: Nishihata in view of Warnes

The Examiner finds that Nishihata would have disclosed to one of ordinary skill in this art a nickel base superalloy substrate which does not have an outwardly grown diffusion aluminide bondcoat and a ceramic thermal barrier coating disposed on the bondcoat. The Examiner further finds that Warnes discloses coating a nickel base superalloy substrate with an outwardly grown diffusion aluminide bondcoat followed by a ceramic thermal barrier coating on the bondcoat which provides higher resistance during high temperature oxidation. Ans. 4, citing Warnes abstract, col. 2, ll. 26-55, col. 4, ll. 39-68, col. 9, ll. 38-61, and Figs, 1 and 5. On this basis, the Examiner concludes that one of ordinary skill in the art would have combined Nishihata and Warnes and thus would have applied the bondcoat and ceramic thermal barrier coating of Warnes on Nishihata's nickel base superalloy substrate to improve oxidation resistance at high temperatures, thus arriving at a coated article falling within appealed claim 11. Ans. 4-5.

Appellant contends that Nishihata and Warner would not have suggested combining these references to obtain a coated article falling within claim 11 to one of ordinary skill in the art. Br. 11. Appellant argues that Nishihata would not have suggested that Warnes' thermal barrier coating system of bondcoat and thermal barrier coat should be used with the high pressure piping made from Nishihata's nickel base superalloy.

We find that Nishihata would have disclosed to one of ordinary skill in this art nickel base superalloy substrates which can be used to form piping and forged products, including pipelines, wherein the nickel base superalloy provides high-temperature strength and corrosion resistance for heat-resistant pressure-proof pipelines in petrochemical plants. Nishihata, e.g., ¶¶ 0001, 0018, 0019 and 0030-0046. Nishihata would have further disclosed a bonding method for the nickel base superalloy pipes which employs a nickel base alloy for diffusion bonding. Nishihata, e.g., ¶¶ 0001, 0007-0017.

We agree with the Examiner's findings of fact from the teachings of Warnes, and Appellant does not dispute the findings. Ans., e.g., 4; Br. 11. We add the following for emphasis. We find that Warnes would have described to one of ordinary skill in the art coated articles formed by coating a nickel base superalloy blade for a gas turbine engine having an outwardly grown platinum aluminide diffusion coating, modified as described, as an intermediate bondcoat for an outer ceramic thermal barrier coating to substantially improve oxidation resistance at an elevated temperature. Warnes, e.g., abstract, cols. 2-7 and 9, and Fig. 1.

On this record, we agree with Appellant that the Examiner has not

explained why Nishihata would have suggested to one of ordinary skill in the art that the high-temperature strength and corrosion resistance above that provided by the disclosed nickel base superalloy is required for the pipes and other articles formed with that superalloy as taught by the reference. Thus, the Examiner erred in not explaining why one of ordinary skill in this art would have been motivated to apply Warnes' thermal barrier coating system to Nishihata's nickel base superalloy articles.

Accordingly, in the absence of a case of obviousness, we reverse the ground of rejection of claims 11-16 under 35 U.S.C. § 103(a) over the combined teachings of Nishihata and Warnes.

II. Claim 11: Gell in view of Warnes and in view of Spitsberg, and Shaw in view of Warnes and in view of Spitsberg

A.

We agree with the Examiner's findings of fact from the teachings of Gell, Shaw, Warnes, and Spitsberg, and Appellant does not dispute the findings. Ans., e.g., 4, 6-7, 8-9, 11-12, and 12-13; Br., e.g., 16-17, 20-21, 24-25, and 28-29. We add the following for emphasis. We find that Gell would have described to one of ordinary skill in the art a nickel base superalloy which can be used to fabricate blades and vanes for gas turbine engines. Gell e.g., cols. 3-6. We find that Shaw would have described to one of ordinary skill in the art a nickel base superalloy which can be used to fabricate blades for gas turbine engines. Shaw, e.g., col. 1, l. 23 to col. 4, l. 20. We further find that each of Gell and Shaw would have disclosed nickel base superalloys containing Hf. Gell, e.g., col. 5, l. 4; Shaw, e.g., col. 1, l. 52.

In addition to our findings from Warnes above, we further find that

the references would have described to one of ordinary skill in the art that in the coated articles, the outwardly grown platinum aluminide diffusion bondcoat is formed on the nickel base superalloy substrate, which contains Hf, by first depositing a platinum layer and then depositing an aluminum containing layer. *See above* p. 5; Warnes, e.g., col. 2, ll. 27-64.

We find that Spitsberg would have described to one of ordinary skill in the art coated articles formed by coating a nickel base superalloy blade for a gas turbine engine with a platinum aluminide coating, modified as described, as an intermediate bondcoat for an outer ceramic thermal barrier coating, which can be yttria-stabilized zirconia, to obtain a thermal barrier coating system having coatings with better adhesion. Spitsberg, e.g., abstract, cols. 2-6, and Fig. 2. Spitsberg would have acknowledged that it was known in the art to form a platinum aluminide bondcoat by depositing platinum and then aluminum. Spitsberg col. 1, ll. 41-50. Spitsberg would have taught that the platinum aluminide bond coating can be applied to any nickel base superalloy blade, and illustrates the nickel base superalloy with a particular nickel base superalloy which does not contain Hf. Spitsberg col. 2, l. 11 to col. 4, l. 5.

B.

The Examiner finds that the nickel base superalloy substrates described by each of Gell and Shaw include nickel base superalloy substrates falling within claim 11 in view of the overlap in weight percent ranges of the elements that are in common; and that in each of Gell and Shaw, the nickel base superalloy substrate does not include a claimed ceramic thermal barrier coating on any outwardly grown diffusion aluminide

bondcoat on the described nickel base superalloy substrate. Ans. 6-7, 8-9, 11, and 13. The Examiner determines that one of ordinary skill in the art would have combined each of Gell and Shaw with Warnes and with Spitsberg, and thence would have been led to apply an outwardly grown diffusion aluminide bondcoat on the described nickel base superalloy substrate followed by forming a ceramic barrier coating on the bondcoat in order to obtain the benefits of such a protective barrier system as taught in each of Warnes and Spitsberg. Ans. 7, 9, 11, and 13.

C.

We cannot agree with Appellant's position that the Examiner erred in applying each of Gell and Shaw in view of Warnes and of Spitsberg to the claimed coated article encompassed by claim 11. Br. 15-18, 19-22, 23-26, and 27-30. Contrary to Appellant's argument that the only motivation to combine each of Gell and Shaw with Warnes and with Spitsberg is hindsight based on Appellant's claims, we find that each of Gell and Shaw and each of Warnes and Spitsberg are directed to the preservation of nickel base superalloy turbine blades for gas turbine engines. *See above* pp. 6-7. Thus, as the Examiner points out, one of ordinary skill in this art would have been motivated to combine each of Gell and Shaw with Warnes and with Spitsberg, and thence would have been led to coat the nickel base superalloy substrates of each of Gell and Shaw with an outwardly grown diffusion aluminide bondcoat followed by a ceramic thermal barrier coating to obtain the benefits of prolonged turbine blade service as taught by Warnes and by Spitsberg. Ans., e.g., 7, 9, 11, and 13. Accordingly, one of ordinary skill in the art routinely following the combined teachings of each of Gell and Shaw

with Warnes and with Spitsberg would have reasonably arrived at the claimed coated article encompassed by claim 11. *See, e.g., KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 415-16 (2007) ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."); *In re Kahn*, 441 F.3d 977, 985-88 (Fed. Cir. 2006); *In re Sovish*, 769 F.2d 738, 742-43 (Fed. Cir. 1985) (skill is presumed on the part of one of ordinary skill in the art); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) ("The test for obviousness is . . . what the combined teachings of the references would have suggested to those of ordinary skill in the art."); *see also Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1364 (Fed. Cir. 2007) ("the expectation of success need only be reasonable, not absolute"); *In re O'Farrell*, 853 F.2d 894, 903-04 (Fed. Cir. 1988) ("For obviousness under § 103, all that is required is a reasonable expectation of success.").

We are not persuaded otherwise with respect to the combination of each of Gell and Shaw with Spitsberg by Appellant's contention that Spitsberg does not disclose the claimed nickel base superalloy substrate, because Spitsberg's alloy does not contain Hf, and thus the combinations are based on "hindsight." Br. 25 and 29. Contrary to Appellant's position, we recognized that Spitsberg teaches the application of the platinum aluminide bondcoat of the thermal barrier coating system on *any* nickel base superalloy turbine blade, even though Spitsberg's preferred nickel base superalloy does not include Hf. *See above* p. 7. Indeed, Appellant does not argue that one of ordinary skill in this art would not have applied the protective system of Spitsberg on the turbine blades of each of Gell and Shaw which are formed

from nickel base superalloys containing Hf. *See* Br. 25 and 29. *See* Gell, e.g., col. 5, l. 4; Shaw, e.g., col. 1, l. 52. We note here that Appellant's "hindsight" contentions with respect to the combination of each of Gell and Shaw with Warnes are not argued with specificity. Br. 17 and 21.

We are also not convinced of "hindsight" in the Examiner's analysis with respect to the combination of each of Gell and Shaw with Warnes and with Spitsberg by the evidence in the "not prior art" Clark and Levi articles as argued by Appellant. Br. 18, 22, 26, and 30, citing Br. 12-13.[2] According to Appellant, Clarke "discusses the status of thermal barrier coating systems comprising a yttria-stabilized zirconia (YSZ) thermal barrier coating deposited onto an oxidation resistant bondcoat applied on a nickel based superalloy component," and opines that it was not known which of such coatings was best for different applications. Br. 12, citing Clarke pp. 389-90. Appellant contends that it is thus apparent from Clarke that "Applicant's significant prolongation of spallation life of the thermal barrier coating is unexpected, and thus the Examiner's "hindsight analysis-based rejection" is in error. Br. 13. According to Appellant, the Examiner's error is further apparent from Levi "that a system perspective must be taken where interplay

[2] D.R. Clarke and C.G. Levi (Clarke), "Materials Design for the Next Generation Thermal Barrier Coatings," *Annu. Rev. Mater, Res.* 2003, 33:383-417 (April 18, 2003); C.G. Levi, "Emerging materials and processes for thermal barrier systems," *Current Opinion in Solid State and Materials Science*, vol. 8, pp. 1-15 (2004). Appellant initially submitted the articles in the Request for Continued Examination filed April 18, 2006, and again in the Evidence Appendix to the Brief. Br. 35. Neither the Examiner nor Appellant has made these documents of record on a reference citation form.

between the substrate alloy, bondcoat, and thermal barrier coating must be considered." Br. 13, citing Levi p. 2.

Contrary to Appellant's contention, Clarke is prior art with respect to the claimed invention encompassed by the appealed claims under 35 USC § 102(a) until established otherwise because the present Application was filed December 11, 2003. Appellant is correct that Levi is not prior art. In any event, we consider these documents as reflecting opinion in the art at the time the Application was filed. In this respect, neither Clarke nor Levi support Appellant's position. Indeed, as the Examiner points out, both Warnes and Spitsberg make it clear that at the time the claimed invention was made, it was known in the art to apply to nickel base superalloy substrates used for turbine blades disclosed by Gell and Shaw, which fall within claim 11, bondcoats, that fall within claim 11, which are further coated with ceramic thermal barrier coatings, falling within claim 11, as taught by Warnes and by Spitsberg. We find no evidence in Clarke and Levi establishing that one of ordinary skill in the art would not have combined the alloys of each of Gell and Shaw with the bondcoats and thermal barrier coats of the thermal barrier coating systems disclosed by each of Warnes and Spitsberg. Furthermore, as the Examiner finds, Clarke establishes that other rare earth metals do not perform in the same manner as Y. Ans. 20, citing Clarke p. 412.

We are further not persuaded by Appellant's contentions that the combinations of each of Gell and Shaw with Warner and with Spitsberg do not disclose the property of the spallation life of any ceramic thermal barrier coating on any outwardly grown diffusion aluminide bondcoat on any

specified nickel base superalloy substrate during cyclic oxidation is "prolonged" to any extent as claimed in claim 11. Br. 17, 21. 25, and 29. We find that it is disclosed in the Specification that "[s]pallation of the [thermal barrier coating] is significantly prolonged when the bondcoat comprises an outwardly grown, single phase diffusion aluminide bondcoat and the substrate comprises the superalloy with Hf and with or without Y present as substrate alloying elements." Spec. 3:13-16; *see also* Spec., e.g., 8-10 and Figs. 3-5. The Specification further illustrates spallation life using an outwardly grown, single phase platinum-modified diffusion aluminide coating and a ceramic thermal barrier coating of yttria stabilized zirconia. Spec. 8-10 and Figs. 3-5. We emphasize that the plain language of claim 11 specifies any ceramic thermal barrier coating on any outwardly grown diffusion aluminide bondcoat on any specified nickel base superalloy substrate, and we find no basis in the claim language or in the disclosure in the Specification to limit the plain language of claim 11 to embodiments disclosed in the Specification. *See above* pp. 2-4. *See, e.g., Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005)(en banc); *In re Van Geuns*, 988 F.2d 1181, 1184-85 (Fed. Cir. 1993); *In re Zletz*, 893 F.2d 319, 321-22 (Fed. Cir. 1989).

In our view, the Examiner has shown that the combinations of each of Gell and Shaw with Warnes and with Spitsberg would have reasonably resulted in the claimed coated articles having the same nickel base superalloy with Hf and with and without Y as a substrate, an outwardly grown diffusion aluminide bondcoat on the substrate, and a ceramic thermal barrier coating on the bondcoat. Thus, we find that it reasonably appears

that the claimed coated articles encompassed by claim 11 and the coated articles suggested to one of ordinary skill in the art by the combinations of applied references are identical or substantially identical even though the claimed spallation life property is not disclosed by the combinations of applied references.

Accordingly, the burden shifted to Appellant to patentably distinguish the claimed coated articles encompassed by claim 11 from the coated articles suggested to one of ordinary skill in the art by the combinations of applied references. *See, e.g., In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990) ("[W]hen the PTO shows sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not."); *In re Best*, 562 F.2d 1252, 1254-56 (CCPA 1977)[3]; *In re Skoner*, 517 F.2d 947, 950-51 (CCPA 1975) ("Appellants have chosen to describe their invention in terms of certain physical characteristics . . . . Merely choosing to describe their invention in this manner does not render patentable their method which is clearly obvious in view of [the reference]." (citation omitted)); *See also, e.g., In re Kahn*, 441 F.3d 977,

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[3] Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. Whether the rejection is based on "inherency" under 35 U.S.C. § 102, on "prima facie obviousness" under 35 U.S.C. § 103, jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the PTO's inability to manufacture products or to obtain and compare prior art products.

Best, 562 F.2d at 1255 (footnote and citations omitted).

985-86 (Fed. Cir. 2006) ("'On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.'") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

We are not convinced that Appellant has carried this burden with the contentions advanced which we have addressed above. We are also not convinced by Appellant's further contentions that Gell and Shaw are inapplicable because W, Ta, and Hf are disclosed by Gell as optional elements, and Shaw discloses that W and Ta are optional elements. Br. 16, 20, 24, and 28. Indeed, Appellant does not argue the positions with specificity, failing to show the criticality of the claimed ranges of these elements as the Examiner points out. Ans., e.g., 19 and 20-21.

D.

Turning now to the evidence in the Specification relied on by Appellant in these respects, Appellant contends that Specification Figures 3-5, as explained at pages 8-10 of the Specification, "illustrate the significant and unexpected prolongation of spallation life of the ceramic thermal barrier coating achieved when the ceramic thermal barrier coating is disposed on the recited outwardly grown diffusion aluminide bondcoat on the recited superalloy substrate composition." Br. 27; *see also* Br. 15, 19, 23, and 27. According to Appellant, the "significant prolongation of spallation life of the thermal barrier coating is unexpected from the oxidation resistance exhibited by" outwardly grown diffusion aluminide bondcoated alloys MDC-150L and

inwardly grown diffusion aluminide bondcoated alloys LDC-2E as shown in Specification Figure 2. Br. 15, 19, 23, and 27.

The Examiner does not dispute Appellant's view of the evidence in the Specification. Ans., e.g., 17-19. The Examiner finds that Specification Figures 3 and 4 show "increasing the amount of [Hf] in nickel base superalloys having a ceramic thermal barrier [sic, coating] disposed on an outwardly grown diffusion aluminide bondcoat . . . in the presence of no [Y] would result in significant prolongation of spallation life of the ceramic thermal barrier coating," and that Specification Figure 5 shows that increasing the amount of Hf in nickel base superalloys with Y increases spallation life. Ans. 17-18. The Examiner determines that claim 11 does not require the presence of a rare earth element or limit the rare earth element to Y, and thus, finds that the showings in the Specification which are limited to the presence and absence of Y are not commensurate in scope with claim 11 because "it cannot be assumed that each and every rare earth element in combination with [Hf] would necessarily" achieve the same result with respect to spallation life shown in the Specification. Ans. 18-19; see also Ans. 20, citing Clarke p. 412. *See above* pp. 11-12. .

With respect to the Examiner's contention that the illustrative embodiments described at pages 8-10 of the Specification, with the results reported in Specification Figures 3-5, are not commensurate in scope with the claims, we find from Specification Table 1 that the three claimed superalloys 1-3 and prior art superalloy CMSX-4 have similar amounts of the same elements with the exception of Hf, which is always present, and Y,

which is essentially present only in claimed superalloys 1 and 2.[4] Spec. 5. We further find that in the claimed coated article embodiments, the bondcoat is a particular outwardly grown, single phase platinum-modified diffusion aluminide coating, designated MDC-150L, and the ceramic thermal barrier coating comprises yttria stabilized zirconia. Spec. 8-10 and Figs. 3-5. Furthermore, the claimed coated article embodiments having superalloys 1-3 and bondcoat MDC-150L and the prior art coated embodiment having prior art superalloy CMSX-4 and bondcoat MDC-150L, are compared with apparent prior art coated article embodiments having the same superalloys 1-3 and CMSX-4 but an inwardly grown, multi-phase platinum-modified diffusion aluminide coating, designated LDC-2E, and an ceramic thermal barrier coating comprising yttria stabilized zirconia. Spec. 8-10 and Figs. 3-5.

We find that Warnes compares coated articles having nickel base superalloys having particular outwardly grown platinum aluminide diffusion bondcoats, designated MDC-151L and MDC-152L which contain Hf and can contain Y, and ceramic thermal bond coatings, with coated articles having nickel base superalloys with outwardly grown, single phase platinum-modified diffusion aluminide coating, designated MDC-150L and

[4] We find that in Specification Table 1, the amounts of Hf, Y, and S in the alloys are stated in "ppm" by weight and the amounts of the rest of the elements in the alloys are stated in "% Wt." Spec. 5. In claim 11, the amounts of the elements of the alloys are stated in "weight %," wherein Hf is present in the range of "about 0.030% to about 0.80%," and Y, a rare earth element, if present is in the range of "up to about 0.050%." *See above* p. 3. Appellant has not adduced evidence establishing the amounts stated in "weight %"of Hf and Y in the illustrative claimed and prior art superalloy.

with inwardly grown, multi-phase platinum-modified diffusion aluminide coating, designated LDC-2E and ceramic thermal bond coatings. Warnes col. 3, l. 11 to col. 9, l. 61. *See also above* pp. 5-6 and 7. We find that the results of cyclic oxidation tests of compared embodiments as reported in the Table show that the MDC-151L and MDC-152L embodiments have increased cycles to failure and relative life. Warnes, e.g., col. 7, l. 38 to col. 9, l. 61. We find that Spitsberg would have described coated articles having a nickel base superalloy with desulfurized platinum aluminide diffusion bondcoats and yttria-stabilized zirconia ceramic thermal barrier coatings. Spitsberg, e.g., col. 2, l. 11 to col. 4, l. 49, col. 6, ll. 45-63. *See also above* p. 7.

On this record, we agree with the Examiner that the showings based on the claimed coated articles embodiments in the Specification are not commensurate in scope with the claims when compared with the applied prior art. We determined that claim 11 is not limited to these embodiments, and further note that claim 16 which limits claim 11 by specifying a single phase platinum-modified diffusion aluminide bondcoat, is not rejected in the grounds we consider here. *See above* pp. 2-3, 4, 6, and 10-11. Indeed, we find that the limited showings do not provide assurance that the same result would be exhibited by the myriads of coated articles based on the same or similar nickel base superalloys, outwardly grown diffusion aluminide bondcoats, and ceramic thermal barrier coatings encompassed by claim 11 and suggested by the combinations of each of Gell and Shaw with Warnes and with Spitsberg would behave in the same manner. *See, e.g., In re Kulling*, 897 F.2d 1147, 1149-50 (Fed. Cir. 1990) (objective evidence

directed to optional embodiments); *In re Lindner*, 457 F.2d 506, 508 (CCPA 1972) ("The claims, however, are much broader in scope, covering mixtures of numerous compounds, and . . . there is no 'adequate basis for reasonably concluding that the great number and variety of compositions included by the claims would behave in the same manner as the [single] test composition.'").

E.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in the combined teachings of each of Gell and Shaw with Warnes and with Spitsberg with Appellant's countervailing evidence of and argument for nonobviousness and conclude, by a preponderance of the evidence and weight of argument, that the claimed invention encompassed by appealed claims 11 and 17 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

III.

In summary, we have affirmed the grounds of rejection of claims 11 and 17 over the combined teachings of each of Gell and Shaw with Warnes and with Spitsberg, and have reversed the ground of rejection of claims 11-16 over the combined teachings of Nishihata and Warnes.

The Primary Examiner's decision is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

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